iNews

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Ron Paarmann photo PN01-460-1-16

Facilities at the INEEL took immediate security measures in response to the Sept. 11 terrorist attack on the United States. This view, looking west from the Willow Creek Building, shows the open spaces required around the perimeter of buildings. Safety and security awareness at the Lab remain at a heightened state.

Novel surface analyzer can detect chemical warfare agents

Researchers can more quickly detect minute residues of chemical warfare agents adhering to solid surfaces using a novel mass analyzer. They can isolate trace amounts of chemical warfare agents within the instrument and then break them apart to obtain chemical identification.

Researchers at the Department of Energy's INEEL can detect part-per-million levels of chemical warfare agents such as the blister agent HD or the nerve agent VX using a novel ion-trap secondary ion mass spectrometer (IT-SIMS).

INEEL researchers are developing surface analysis instrumentation for environmental samples such as soil or plant surfaces. Better analytical techniques for these kinds of materials support environmental restoration and national security Department of Energy missions. Chemical warfare agent detection is just one application of IT-SIMS.

Results are published in the International Journal of Mass Spectrometry, volume 208.

Using IT-SIMS, researchers bombard the surface of a sample with a polyatomic projectile to lift or "sputter" off molecules adhering to the sample surface. The sputtered molecules, called secondary ions, retain the chemical characteristics of the chemical warfare agent stuck to the surface of the soil. The secondary ions are filtered by mass and then counted. That data is displayed as a spectra (a bar graph that plots the number of ions versus their mass) that researchers then use to identify the chemicals.

IT-SIMS is particularly suited to applications such as chemical weapon agent detection because such chemicals are designed to be both adsorptive and persistent-to stick to any and all surfaces and stay there. Using IT-SIMS, researchers can collect large numbers of intact ions from the sample surface and accurately identify the chemical substances. Researchers can analyze samples as small as 3 to 4 mg with minimal sample preparation on the order of 5 minutes.

Purpose of the current two-year study is to test the feasibility of using IT-SIMS to detect chemical warfare agents, and then develop portable instrumentation. The design and fabrication work, chemical agent degradation product and precursor testing is being carried out at INEEL facilities.

Testing of live chemical warfare agents is being conducted under controlled conditions at the U.S. Army West Desert Test Center chemistry laboratory, Dugway Proving Ground, Dugway, Utah. This research is supported by the Defense Threat Reduction Agency (DTRA).

PIP Status Review

Corporate leaders endorse teamwork of Six Sigma projects

INEEL's Six Sigma efforts earned praise recently from several Bechtel corporate officials.

"My hat's off to you," Tom Hash, Bechtel National, Inc. president, told INEEL Six Sigma participants after hearing summaries of process improvement projects at a PIP status report meeting Sept. 5. "You're doing excellent work."

Undertaken as one of the Restructuring Opportunities Team's initiatives to improve management systems at the Lab, numerous employee teams reviewed dozens of INEEL systems and processes to come up with PIPs (process improvement projects) that will save the Lab tens of millions of dollars in coming years. The employee teams used the Six Sigma approach in finding ways to improve or eliminate procedures and processes.

Six Sigma Black Belts at the INEEL — and consulting Black Belts from other Bechtel organizations — guided the teams in using Six Sigma tools and methodologies to create efficiencies and reduce redundancies.

Fifteen PIP team leaders described Integrated Executive Council-approved recommendations to improve efficiencies or take work out of the system. PIP teams looked at a range of ideas: things such as consolidating job functions, improving efficiencies in creating intranet Web sites, and reducing the number of signatures required for INEEL.

The 15 processes were among the first 29 reviewed by the IEC for implementation. All 29 fit into the company's SBMS (Standards Based Management Systems), the INEEL's overarching system for implementing standard procedures.

(Story continues on Page 2)

Paper's final issue

This is the final issue of *iNews* because of changes in priorities and resources within the INEEL Communications Department.

We will continue to keep employees informed of Laboratory activities and events through electronic and printed communications vehicles.

Being your editor the past eight years for *INEL News*, *LMITCO Star* and *iNews* has been a privilege. Best wishes to all.

Rick Bolton
Communications

PIP achievements

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These 29 were among about four dozen processes identified as allowing the INEEL "to get the most bang for the buck" by changing processes.

DOE support

Paul Rosenkoetter, Management Systems Restructuring vice president, said he's working with the Department of Energy Idaho Operations Office to make sure DOE agrees with proposed process improvements. So far, the company's credibility with its customer is allowing the Integrated Executive Council to go forward with process improvement teams' recommendations, he said.

John Evelyn, a Six Sigma consultant, said a common theme emerging from the presentations is that from the process improvement plan, teams are challenging specification requirements of INEEL procedures.

Evelyn said, "You're moving from a management system that responds out of fear to one that says, 'I'll do it a different way.' That's the first step toward freedom. Your customer will respect you for managing in a way that reduces the need for so many regulations.

Ask the customer to trust the data and knowledge base, and buy into new processes with a different level of performance.

"Admittedly, you are acting now out of desperation (because of the tight budget). When you do this and survive, then you will do this with inspiration and grow funding for the INEEL."

Process improvement realities

Other themes that emerged from the half day of presentations:

- In part because of a history of multiple contractors operating at the INEEL and for other reasons, procedures are implemented inconsistently.
- Procedures are oriented to achieve compliance rather than performance, resulting in a conservative — rather than a graded — approach.
- Good compliance data exists, but there is a lack of enough performance data to manage work efficiently.
- Adequate metrics are not in place to measure results and achievements.
- Some employees embrace change and others resist it.
- Senior management is committed to process improvement.
- The company should streamline processes and encourage all levels of management to accept change.

INEEL process improvement project team members told corporate executives that while they do encounter resistance to changing or streamlining processes — and to using a "graded approach" to implementing procedures based on the nature of the work — at the same time, many employees are excited about long-needed improvements.

"Managers and employees want changes; they're enthusiastic about the opportunity to get rid of ridiculous processes or procedures," said Mike Fox, Management Systems Restructuring director. Some processes have evolved over many years, and they've become inefficient and out of date, he said. When process improvement teams say they're going to go back to the root cause of bloated processes and fix them, employees are skeptical because similar promises haven't always been fulfilled, Fox said.

Ron Paarmann photo PN01-410-1-4a

Bechtel National, Inc. corporate leaders and Six Sigma consultants from Bechtel and private firms listen to results of INEEL Process Improvement Project teams at a report meeting recently in Idaho Falls. Team leaders were commended for making better business practices a part of the work culture at the Laboratory.

"We want to reward people for doing the right thing, and allow them permission to do the right thing. We are putting in place processes to minimize the opportunities for managers to say, 'no, we can't do this.'" Director-level managers have been asked to prepare implementation plans to put streamlined procedures into place.

Momentum in spite of barriers

Larry Donovan, BNI chief financial officer, praised the INEEL Six Sigma initiatives for making process improvements part of the way the INEEL does business.

"You have one heck of a lot of momentum in spite of some barriers," Donovan said. "You're driving the process changes with good people, and clearly identified the cost and efficiency rewards of these improvements. I congratulate all the teams for their hard work, and for tackling these challenges."

Ray Gorski, BNI vice president and manager of services / project controls, urged the teams to leverage the advice of Black Belts to help employees and managers use Six Sigma tools to accomplish goals. "If you employ the same passion in implementing these process improvements as you have identifying them, you'll be successful in streamlining processes," he said.

BNI's Hash told PIP leaders, "You are on the front end of establishing processes that can continue for a long time. You have an urgency to your timetables in your need to take out large amounts of costs. I have high hopes your customer will be pleased."

Ron Paarmann photo PN01-410-1-20a

Tom Hash, Bechtel National, Inc., president, (gesturing in center of photo) offers ideas to members of a Process Improvement Project team at the recent PIP Project Report meeting.

Idaho group wins American Nuclear Society's top honor

The Idaho Section of the American Nuclear Society has been selected as the best overall large section by the American Nuclear Society at the organization's recent national meeting.

The award was given in recognition of the group's membership, meetings, programs, public information and education, and section management.

"It is great to be recognized by our peers as being the best," said Chris Ischay, president of the local section. "What an exciting time for all of us, especially those of us who have a connection to the great scientific past of our work and made it through the nuclear-negative 1990s."

Ischay is a staff engineer / scientist at the Idaho National Engineering and Environmental Laboratory. He recently completed his one-year term of office.

Newly elected section president is Kathryn McCarthy, INEEL Nuclear Engineering Design and Research Department manager. Vice chair is John Kotek of Argonne National Laboratory-West. Eric Loewen of the INEEL was elected secretary and Bonnie Hong of the INEEL was elected treasurer. Steve Herring, Bob Skinner and Ischay were elected to the board of directors.

Safety audits recognize confined space database improvements

Recent safety audits have recognized employees' efforts to improve the use and storage of INEEL confined space documents.

The combined efforts of industrial hygienists, planners and the fire department at Central Facilities Area were identified as noteworthy improvements in the last year during internal audits and reviews by Integrated Safety Management System and Voluntary Protection Program authorities.

Improvements include using an accessible online database (complete with search capabilities, pictures of the spaces and the hazard evaluation forms); incorporating requirements into the work package to simplify and reduce paperwork, time and cost; and establishing a method to downgrade a confined space if certain conditions are met.

Praise for the efforts have come from several parties. Trades employees, their foremen, and project planners have recognized and commented on the enhanced work orders with all the confined space requirements. The Department of Energy Idaho Operations Office ISMS auditor, the industrial hygiene home organization and the INEEL internal audit group also identified the database as a noteworthy practice.

Those credited with improving the database include industrial hygienists Jim Downes, Alex Britain and Jeff Erickson; Bob Macfarlane of ESH&Q; Connie Bates of Document Control; Larry Fiedler, a CFA planner; and battalion chief Paul Martindale.

Mike Crane photo PD01-0433-01

Industrial hygienists meet to review modified work orders for a nonpermit required confined space with other team members. Left to right, Alex Britain, certified industrial hygienist; Greg Archibald (holding work order), system mechanic; Lou Mangan, planner; Jeff Erickson, certified industrial hygienist; and Paul Martindale, Fire Department battalion chief.

Joint effort

A joint effort between CFA industrial hygienists and planners enabled them to incorporate requirements and controls for nonpermit confined spaces into the work orders. This eliminated superfluous paperwork (confined space permits), resulting in time and money savings. Planners — including Matt Brandley, Lou Mangan and Jeff Harris — worked with Erickson to make the work orders complete. Erickson and Downes also teamed up to establish a graded approach to permit and signature requirements for work orders.

The process improvement leading to creation of the database occurred because it was difficult to keep hard-bound materials up to date. In the past, various CFA facility managers kept confined space inventories and evaluation forms as hard copies. Most of the hard copies had some updates but were not all-inclusive.

Now, the database provides a single, consolidated, desktop-accessible inventory complete with hazard evaluation forms, internal and external pictures of each confined space, a "zoomable" map with a link to additional information, and the CFA confined space inventory.

User-friendly database

Users can locate individual confined space information by clicking on each confined space shown on the map, or by clicking on the line item entry on the confined space inventory.

Minimal resources were used to create and maintain the database, which provides easy-to-use and user-friendly, desktop access to the most current copy of information by planners, industrial hygienists, responsible managers, building engineers, emergency responders or any other INEEL employee. Two CFA industrial hygienists control input into the database.

Useful Lab-wide

The database is accessible by a variety of disciplines. For example, the pictures help the planners, fire department and industrial hygienists identify the space, hazards and content. They provide visual verification of each space to minimize misidentification, and they help planners by providing a virtual picture of the confined space configuration from the convenience of their offices. This reduces time in the field and hazards associated with accessing some spaces.

Online access to the inventory and hazard evaluation sheets provides firefighters with the pictures and entry information crucial for determining rescue techniques during an emergency response. Responsible managers have a current, sole source for meeting inventory requirements. Industrial hygienists have easy, desktop access with the pertinent information to determine appropriate controls when processing entry permits and work orders.

Simplified process

Enhancements have simplified the process for spaces frequently entered such as the Air Handling Units and drinking water pump pits.

The hazard evaluations, pictures and database were developed and collected over the past two years. Changes to the work orders were made in the last year.

For more information on the database, contact Jeff Erickson (526-0674, eri@inel.gov).

To access the database, click on the START button, pressing Find and Computer. Enter Alex when prompted; double click when Alex is found and then double click on the Shared folder and the file-index. This presents an index with the Confined Space option.

Research into advancements for the Portable Isotopic Neutron Spectroscopy System (PINS)

Used by U.S. Army's Tech Escort and the Defense Threat Reduction Agency (DTRA) around the country and other organizations around the world, PINS is clearly established as a premier technology in identifying chemical warfare agents within stockpile and non-stockpile munitions. This recognition has further expanded through its use in environmental applications while confirming contents of abandoned cylinders and long retired operational chemical storage tanks.

Idaho National Engineering and Environmental Laboratory developers of the award-winning technology, however, aren't content to leave well enough alone. They, funded by the DTRA, are looking for ways to make it work faster, just as reliably, and ship more easily.

INEEL researcher Gus Caffrey says. "PINS uses a small radioactive source, californium 252, as the neutron source. As effective as it is, shipping radioactive sources carries some logistical problems."

The PINS source requires NRC licensing, and air shipment is mostly restricted to cargo planes. While the PINS equipment and technicians can quickly respond to a need at any location, urban or remote, the source must travel separately in conforming to hazardous material shipping rules. Further, radiation safety issues must be carefully monitored through administrative practices and engineering controls. Caffrey believes he can reduce or eliminate these issues while increasing the speed and sensitivity of PINS by replacing the source with a neutron generator.

The advantages are significant. The neutron generator is a radiation source that can be turned on and off with a switch and requires no NRC license. Early test results show it to be just as penetrating as the californium, so PINS can still "see through steel" of up to two inches.

The disadvantages are few and are the focus of the research. In the next months, Caffrey and colleagues will continue to design and test the next generation of PINS.

Local small business tests detection of enriched uranium system to reduce nuclear weapons proliferation threats

An Idaho Falls small business under contract with the U.S. Department of Energy is developing and testing a portable system designed to better protect the world from possible nuclear weapons proliferation threats, by measuring amounts of enriched uranium in spent nuclear fuel.

The most prominent near-term use for the system is to verify that the amount of fissile uranium that was shipped out of the U.S. decades ago corresponds to the amount slated for return to the U.S. Such verification will decrease the possibility that this material could be illegally diverted for use by terrorists or unfriendly governments in crude nuclear weapons.

Idaho Falls-based Global Technologies Inc. (GTI) designed and built a prototype of the Detection of Enriched Uranium System for DOE. GTI scientists designed, fabricated and conducted initial tests of the prototype during a 10-month period in 1999. Collaborative work at the Idaho Accelerator Center at Idaho State University, the Nuclear Science Center at Texas A&M University and the Nuclear Reactor Facility at Kansas State University helped make the system's first phases of testing successful. Compared to other systems with similar capabilities, GTI's system is simple, portable, and relatively inexpensive. The project has cost DOE $800,000 since it was started in 1998.

"This new system can tell us whether we are getting back the amount of fissile material we think we're getting back from the Atoms for Peace Program that our nation initiated in the 1950s," said Peter Dirkmaat, director of INEEL's Idaho Nuclear Technology and Engineering Center Programs Division with the U.S. Department of Energy. "The great thing about this system is that it is a very simple, very precise and portable tool for performing these necessary verifications."

This month with support from the U.S. State Department, GTI will test the prototype at a foreign research reactor for the first time, at the Instituto Nacional de Investigaciones Nucleares' TRIGA reactor in Salazar, Mexico. Its goal is to measure how much uranium-235 is in the reactor's spent nuclear fuel. If tests on the system continue to show success, inspectors will be able to use the system to make these kinds of measurements at future foreign research reactor sites as U.S.-originated enriched uranium is returned to the DOE. The system's ability to measure fissile inventory is also important to safely shipping spent nuclear fuel, storing it and eventually placing it in a national repository.

During the 1950s and 1960s as part of an international program initiated by the United States to encourage peaceful uses of the atom, called Atoms for Peace, enriched uranium fissile material was sent to 53 nations for nuclear research. Nineteen of these nations employed TRIGA (Training, Research, Isotopes, General Atomic) research reactors used for energy, medicine and materials performance studies. Under terms of the U.S. Foreign Research Reactor Return Program, the TRIGA spent fuel from many of these reactors will be returned to the U.S. by 2009.

GTI is a nuclear technology-oriented business with headquarters in Idaho Falls, and satellite branches in Richland, Wash.; Washington, D.C.; and Las Vegas. Francis Tsang, a former INEEL scientist, is president of GTI., which employs 30 people locally.

MILESTONES

September service anniversaries

40 years — J. Lynn McCardell

35 years — Neal Boyce, James Delmore

25 years — Marianne Atkinson, William Downs, Clifford Fineman, Gene Hochhalter, Jack Jacobi, David Schwieder, Gary Simpson, James Wasylow, Helmut Worle

20 years — Gina Bailey, Bruce Baumgart, Cynthia Caudle, Daniel Haley, Kristine Inskeep, Emma Kopp, Ray Miles, Kenneth Moor, Raymond Powell, Paul Ritter, Roger Williams

15 years — William Bennett, John Birchler, Cindy Brenchley-Richards, Duane Elder, Gary Groenewold, Todd Heyrend, Bernice Kunkel, Tory Landon, Ronnie Murray, Christine Satterwhite, Lonnie Scott, Bradley Simmons, Steven Smith, Dine Smith

10 years — Paul Beutler, Michele Brewer, Claudia Cloud, Curtis Collard, Larry Dickerson, John Gilbert, Adam Gott, Mark Graham, Ruby Hammond, Gregory Hope, Scot Jenkins, Mark Knickerbocker, William Larson, Randall Laviolette, Edward Lee, John Lenartz, Vanessa Meyer, Glenn Moore, David Morrow, Jonna Nielsen, Tim O'Rourke, Jon ORullian, David Parmer, Daryl Peterson, Mark Pettichord, Kimber Poole, Frederick Ranstrom, Danny Rowley, Lyle Roybal, Thomas Stoops, Clay Thomas, Wendell West, Donna Whitham, Kelly Wiseman, James Zolynski

5 years — Shane Christensen, Thomas Harrison, William Hurt, Adrian Quezada

Subsurface science projects

Regional universities chosen for research grants

Six subsurface science proposals have been selected for funding as part of a joint collaborative research program between the Inland Northwest Research Alliance and the Department of Energy's Idaho National Engineering and Environmental Laboratory.

The six new grants are in addition to 13 grants awarded last year. The grants are designed to organize collaborative research projects at INRA universities and the INEEL into a cohesive program that achieves national and international recognition in subsurface science, according to Gautam Pillay, INRA's executive director.

"These proposals have the potential to develop into new, significant collaborative research opportunities at INRA institutions and INEEL," Pillay said. Work on the projects begins Oct. 1.

Funding for the 19 projects total over $4.3 million over three years and fund doctoral and postdoctoral researchers who will work on collaborative projects. That total includes over $1 million that the INRA member institutions will contribute toward the projects. The researchers will spend time on their projects at the INEEL and INRA campuses.

The newly awarded projects include:

- Characterizing inorganic precipitates formed on mineral surfaces, Montana State University and INEEL
- New methods to characterize transport of microbes in aquifers, Boise State University, Montana State University, Pacific Northwest National Laboratory and INEEL.
- Microbial reduction of metal ions in solution, Washington State University, Montana State University and INEEL.
- Study of enzymes to detect microorganisms which destroy contaminants, Idaho State University and INEEL.
- Development of a computer model to predict how uranium and other rare earth elements absorb onto materials used in waste management, University of Idaho and INEEL.
- Study of uncertainty in predicting water flow and contaminant transport in unsaturated soils, Washington State University and INEEL.

The selection of the projects coincides with a recent visit of the INRA Board of Trustees to Idaho Falls where the Presidents of the seven INRA universities toured the laboratory and met with INEEL and DOE-ID senior managers.

INRA leadership also spent two days recently in Washington D.C. where they met with regional congressional delegations to share information concerning how the INEEL and the INRA universities are working together in areas relating to subsurface science.

Seven universities formed the Inland Northwest Research Alliance (INRA) in the spring of 1999. The member universities include Boise State, Idaho State, University of Idaho, Montana State, University of Montana, Utah State and Washington State.

Idaho forming Geothermal Working Group

The Idaho Geothermal Working Group is being formed to develop strategies for addressing issues facing geothermal energy development within the state.

The group's formation is just one of several actions identified earlier this summer from a two-day Idaho Geothermal Energy Stakeholders Workshop at Boise State University. The workshop was hosted by Idaho Sen. Larry Craig in cooperation with the Idaho National Engineering and Environmental Laboratory.

Geopowering the West

It was part of DOE's "GeoPowering the West" activity, a cooperative federal, state and local effort to promote awareness of the vast geothermal resources in the Western United States.

Addressing the workshop, Sen. Craig stated that the United States must have an adequate supply of energy to sustain our economy. He said the Western United States is in an energy crisis, and must expand as part of a balanced Energy program its energy infrastructure and diversify energy sources.

Geothermal energy is an important, and largely untapped, source of clean, economical energy in the West, the senator added.

Idaho Gov. Dirk Kempthorne proclaimed June as Idaho Geothermal Awareness Month and encouraged Idahoans to "learn more about geothermal energy and how it can be incorporated into their lives and businesses to provide an environmentally friendly, renewable resource of energy to help power Idaho's future."

Peter Goldman, DOE-HQ Office of Wind and Geothermal Technologies director, said he wants to see a dialogue initiated between the people in Idaho who are interested in the development and use of geothermal energy. He hopes the dialogue will help identify barriers and remove those impeding geothermal development. He plans to form a National Geothermal Coordinating Committee to help states with geothermal working groups.

Timing right

Bob Neilson, INEEL renewable energy and power technologies manager, said with today's energy crunch, the timing is right for Idaho leaders to work together to use our homegrown energy.

"This is a clean, reliable form of energy that has been barely tapped," said Nelson. The INEEL conducts research and development in several areas of vital importance to the geothermal industry and the public, including geoscience and energy systems development. The INEEL is the DOE Geothermal Program lead laboratory for geoscience.

Geothermal benefits

As part of the workshop, Idaho businesses described the benefits provided by geothermal direct use in district heating, aquaculture and greenhouse applications, and by geothermal electric power generation. The Geothermal Energy Association and Geothermal Resources Council presented its Award for Outstanding Geothermal Contribution to the city of Boise for its geothermal district heating system.

The system was supported with funding and planning assistance from DOE's Idaho Operations Office. The city of Boise system, Boise Warm Springs Water District, Veterans Administration Hospital system, and the Capitol Mall Complex system provide clean and economical heat to 366 buildings or 4,426,000 square feet in Boise. Idaho is the only state whose capitol is heated with geothermal waters.

Roy Mink, director of the Idaho Water Resources Research Institute, noted that Idaho has some sites with potential for generating electricity that are located near existing transmission lines. These include Big Creek in central Idaho, Crane Creek near Weiser, Vulcan Hot Springs in central Idaho, and Magic Reservoir south of Sun Valley.

The Idaho Energy Division of the Idaho Department of Water Resources will take the lead for the Idaho working group, which includes representation from the range of geothermal stakeholders in Idaho. The group will meet this summer to organize and identify issues and actions.

For more information, contact Gerry Galinato, Idaho Energy Division, 208-327-7963, or Bob Neilson, INEEL, 208-526-8274.

Treating hazardous compounds
INEEL signs pact to commercialize technology

Researchers are using high-energy X-rays to decompose hazardous organic compounds such as PCBs into their harmless components of water, carbon dioxide and salt.

The technology, a major improvement over the conventional method of incinerating PCBs, was developed at the Idaho National Engineering and Environmental Laboratory. Evergreen Recycling International, Alfred Station, N.Y., has signed an exclusive license with the INEEL to commercialize this technology.

The United States has incinerated PCB-containing materials for years, but barrels of contaminated oils and polluted soil sites exist throughout the country and around the world. According to researchers, incineration is losing popularity in this country as an environmental cleanup process. Many foreign countries, such as Argentina, have eliminated it as a remediation alternative altogether.

The INEEL process aims X-rays, powerful versions of those routinely used in every dentist office, on the liquid to be treated. The X-rays break some of that liquid into pieces called radicals which then react with the hazardous compounds, turning them into environmentally safe ingredients.

Early experiments at the INEEL used gamma rays from readily available spent fuel from the Advanced Test Reactor to produce the X-rays. Results were favorable, but reactor radiation was impractical for future commercial applications. Isotopic sources would require permanent shielding and would face almost insurmountable licensing restrictions. Researchers Bruce Mincher, Rod Arbon and David Meikrantz turned to the Idaho Accelerator Center at Idaho State University.

Viable alternative

Operated in partnership with the university and the INEEL, the Idaho Accelerator Center offered a viable alternative to reactor fuel to generate the X-rays. Within an accelerator, electrons are speeded up, then crashed into a target. When the electrons crash, they give off energy as X-rays. "The accelerators worked great," said chemist Mincher. "And at the end of the day, you can turn them off and they're not radioactive."

The treated liquid is not radioactive, either. Mincher and Arbon proved the oils could be made PCB-free, without being made radioactive by this process in 1996 for an Environmental Protection Agency demonstration. Mincher said, "A patient doesn't become radioactive when his teeth are X-rayed, and neither do our treated materials. Since we're using it for environmental cleanup, we call it green radiation.

"The concept began as a research project. We used our money to work out a good idea," says Mincher.

The fundamental chemistry research was needed to understand the mechanics of the reaction and to confirm there were no hazardous by-products. This early research involved many compounds in addition to PCBs.

"The initial results were positive," said Mincher. "Then DOE Environmental Management asked us to concentrate on PCBs and turned it into a real program. From there, we tested it on actual waste, using contaminated oils at the INEEL in the demonstration for EPA."

The INEEL patented the successful technology. Mincher's and Arbon's work caught the attention of the commercial world and Evergreen Recycling International.

Commercial world

Evergreen Recycling International's President Roland Hale explained company plans for the licensed technology. "Many industries, utilities and municipalities have PCBs which need remediation. Depending on the quantity of chlorinated hydrocarbons, we may use a plant or a small portable unit on site. Once the oil is dechlorinated, it can be sold as heating oil or fuel for electricity generation."

Mincher and Arbon are pleased with the licensing. "It's a great feeling of satisfaction to see a concept go from inside a laboratory out into the world," said Arbon. Since Oct. 1, 2000, INEEL has entered into 15 license agreements.

Mincher and colleague Bob Fox are now focusing on improving the process on soils by combining it with another patented technology called supercritical fluid extraction based on work started at the University of Idaho by Chien Wai.

Pressurized vessel

Similar to the process used to decaffeinate coffee, the soil is loaded into a pressure vessel and carbon dioxide is pumped in. Temperature and pressure are increased to the point that the carbon dioxide hovers between a gas and a liquid, allowing it to permeate every particle of the soil. The carbon dioxide is removed, taking with it the PCBs that can then be destroyed.

Mincher is also experimenting with removing plutonium from soil using the same supercritical fluid extraction process. He adds a special molecule attractor called a ligand to the carbon dioxide stream that captures just the plutonium. Mincher is conducting the experiments on the tandem processes at the INEEL and the IAC. Initial results show that greater than 99 percent of the PCBs and about 95 percent of the plutonium are removed from the soil.

Life after work: A Tenacious journey across the open seas

One retired couple is proving that there is plenty of life yet to live after leaving the workplace.

Former INEEL employee Bert Barnes, his wife, Sheron, and their family cat, Bandit, are sailing the Pacific Ocean aboard their sailing ship the Tenacious, pursuing a life-long dream.

After sailing up and down the Pacific Coast last year, they set out this spring from the Pacific coast of Mexico for the Marquesas Islands in French Polynesia.

Traveling with a fleet of other small boats for security — and assistance when boating equipment fails — they often sail alone, out of sight but within radio contact of fellow sailors.

Surrounded by nature, Bert and Sheron tell a portion of their tale of adventure in these radio-to-Internet dispatches. *(If their account appears disjointed, the editor accepts blame for choosing selected dispatches):*

First day: Our grandest adventure has begun; we are headed to the Marquesas Island Group in French Polynesia at roughly 9S; 140W. We left Punta Mita (20 deg. 45.629'N; 105 deg. 31.497'W), Mexico at 11:10 a.m. Skies were sunny and only a faint breeze was blowing from the nw as we hoisted anchor. Our departure was slow; we only made 0.8 to1.9 knots. We first sailed to clear the islands and rocks in the mouth of Banderas Bay. We are healed over about 12 to 15 degrees to port and making good time considering the direction and speed of the wind.

Our new wind knotmeter is not working, so we will have to estimate our wind velocities, unless Sheron decides to go up the mast and fix it while we are under way — you guessed it — that is extremely unlikely!

About an hour ago, Sheron spotted a baby killer whale which breached twice about 60 yards off our starboard rear quarter. She has also seen some dolphins racing alongside the boat as we speed west. Bandit interrupted his afternoon nap to come up on deck and get petted. He quickly went back down below to the aft cabin to resume his daily afternoon nap.

The boat seems to be running well. Here at the navigation station, I can hear the water streaming past the hull as the boat slowly pitches and rolls. All the many months of preparations are giving us a good start. All the many pounds of food and fuel and supplies do add weight and slow the boat, but it is a fast, seaworthy cruising boat, as sailboats go.

It seems that a quote from one of the world's greatest explorers might be appropriate. Title: The Courage to Succeed, "The sea is dangerous and its storms terrible, but these obstacles have never been sufficient reason to remain ashore ... unlike the mediocre, intrepid spirits seek victory over those things that seem impossible ... it is with an iron will that they embark on the most daring of all endeavors ... to meet the shadowy future without fear and conquer the unknown." Ferdinand Magellan (c 1520).

(Three days later) Since our last Chronicle, we have long since lost sight of land. We have been on route about 50 hours or a little more than 2 days now. We traveled nearly due west until this morning,when we opted to drop south to sail first east then south of the Mexican islands known as Islas de Revillagigedo located in the vicinity of 19N; 111W. Our progress sailing to weather has been slow; we have only covered 253 nautical miles (291 regular miles) in about 50 hours. That is an average of only 5.06 knots ~5.82 regular miles per hour. Beating to weather the ride has been rougher and the pace slower.

After heading more south (207 deg. magnetic) this morning, our pace has increased and the ride is smoother. Sheron and Bandit are asleep after a long, cooler-than-normal night. We have still not gotten accustomed to the night watches and periods of sleep of between 2 and 3 hours. As Sheron was preparing dinner last evening in rough and confused seas, she indicated she was feeling a little green; that is as close as either one of us has been to sea sickness. So far, so good!

At 12:45 this morning, Sheron awoke me because we had come upon a ship (200+ ft??) just sitting out in the ocean with only its running lights on. After we determined that it was not moving and that no one would answer our VHF radio calls, we opted to stop circling and simply sail on. The ship continues to be a mystery!

With the exception of SEASHELL AND FOUR WINDS, the other 6 boats are strung out over hundreds of miles of ocean based on their position reports. The first wave of "puddlejumpers" is so far out in front of us that we have formed our own radio net to make communication less difficult.

I just went topside after hearing a Mexican radio call to see if there was a vessel in sight. "Nada," only a rather lonely brown boobie bird circling Tenacious and occasionally diving into the water to catch a fish. The weather is overcast, though the sun shows through here and there.

It is taking us time to get used to the constant motion of the boat and the roar of water rushing past the hull. Just walking around takes two hands to steady yourself and the floor is sloped about 12 to 16 degrees and constantly pitching up and down. Sheron did a great job of packing things into each little nook and cranny; even at that, the floor boards constantly squeak as the hull is flexed in the waves. On deck, forward of the cockpit, the decks are often wet from splashing waves. As I sit here at the navigation station, I see water splashing up into the tightly closed porthole in the main salon; occasionally the Porthole is totally covered with green water. Perhaps if I look carefully, I will see a fish!

Friday morning: Last night, Sheron suggested we try 2 hours on and 2 hours off (sleeping) watches; it seemed to work okay, though we will both need to sleep off and on today to catch up on our beauty rest. Last night's watches were pleasantly uneventful!

Sheron fed Bandit some more canned chicken this morning; he really likes it. Last night Bandit did not come out with the watch keeper, but instead opted to stay with whoever was sleeping in the aft cabin. He seems to be feeling better now, at least as good as an 18 year old siamese cat can feel!

(Several days later) Today is the 6th day out of Banderas Bay, Mexico, and we have come only 791 nm (911 regular miles). Though we are well north of the Inter-Tropical Convergence Zone (ITCZ = doldrums) we are still bordering an area of "strong convection" where air is rising as it does in the ITCZ. Our weatherman and fellow cruiser Don Anderson (S.V. Summer Passage) of Newport, Calif., tells us that this line of strong convection runs within 100 miles of the line between 15N; 115W and 6N; 130W. We get daily weather reports from Don via radio e-mail.

We took advantage of yesterday's slower pace to do some laundry. Sheron also did some reading on the islands in French Polynesia that we will visit first. We also used the period of slow going to catch up on our sleep and write some e-mail to our family. We are becoming accustomed to life on board a rolling and rocking platform, though we still have our little mishaps. Yesterday afternoon, after Sheron had started to make fresh orange juice in her new blender, she set a full blender container of fresh juice on the galley counter for a second, only to have the boat roll and dump the entire liter of sticky orange juice all over the galley counter top. She is now over being despondent about it and is even starting to see the funny side of the incident! Similarly, while I was transferring diesel fuel from an on deck "jerry can" to the port side fuel tank, the rolling of the boat made me spill a few cups of diesel all over the port side deck. Another mess to clean up and new lessons learned!

The ocean has changed color to the most beautiful deep American flag blue. The overcast skies have really been a blessing, though in spite of that, Bert managed to get his face slightly sunburned yesterday while out on deck doing chores. He must remember to wear that hat and use sunscreen! We have been surprised that we have not seen more ocean wildlife since leaving the coast.

Horizon to horizon, the view is always the same, just sky and waves. "Water water every where, / Nor any drop to drink," a more modern version of this from the ancient Mariner might read "Water water every where with nary a drop to drink--unless you have a watermaker!"

We are starting to understand why the Pacific Ocean is known as the world's largest ocean, covering 64 million square miles, not including another six million square miles in adjoining seas. The tropical South Pacific areas that we will visit first are Polynesia, Micronesia and Melanesia. These are the waters we have all read about since childhood.

(Days later) A short while ago, we passed about 30 miles west of one of the many ATLAS large automated weather buoys they have anchored to the bottom at various places around the Pacific Ocean. They provide accurate measures of wave height & period, wind velocity, temperature, barometric pressure, and the time the train leaves for Tobogan. All this data is radio transmitted in to some central location in Colorado in an attempt to make your weather man look a lot smarter than he really is. I believe the tops of the buoys employ solar cells and batteries to provide the electric power needed to transmit weather data.

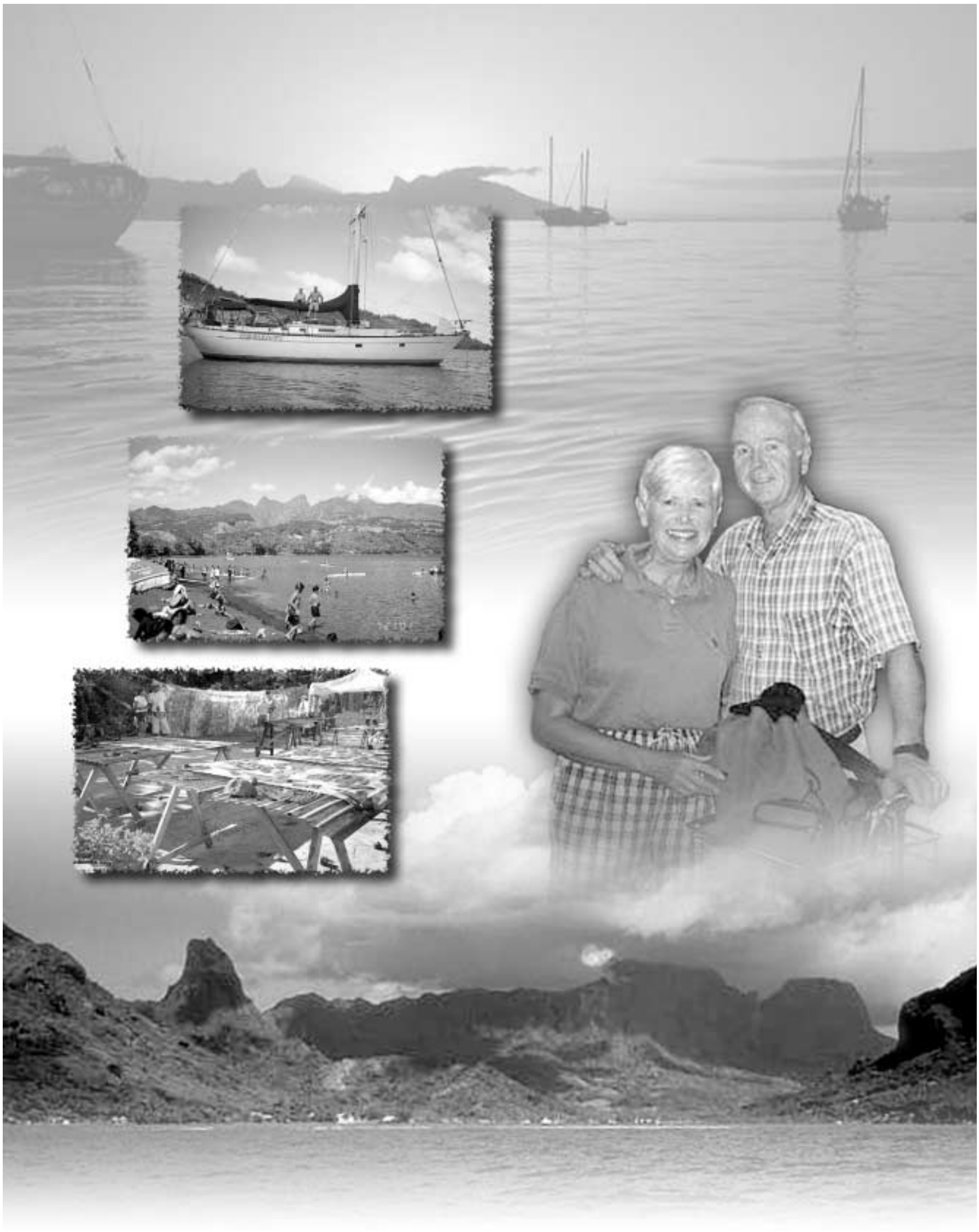
These buoys are definitely something you do not want to run into in the dark. They have no lights, only radar reflectors! According to the literature they are orange and white, 6' across, 8' tall, and weigh 500 lbs. They are placed in rows 4 to 7 along lines of constant longitude and typically 2 to 4 degrees of latitude apart.

Last night, Sheron again awoke me to help navigate Tenacious around a lighted fishing boat directly in our path southward. We took the boat off the autopilot, changed course 90 degrees to the west for about an hour, then resumed our prior course.

Sheron went to bed. No sooner had she gotten to sleep than I started to encounter more lighted fishing boats. They were hard to see among the rain squalls on the radar; often they would be inside a squall and masked by the squall's radar signature. However, the strong lights made the fishing boats easy to see. All in all, we never passed closer than 2 n. miles of any of these fishing boats. I have no idea what country these boats are from fishing ~1600 nm off shore. In the dark, we could not even see if they were using lines or nets.

The apparent lack of organization among all these South Pacific bound cruisers is really not surprising. While there is risk in generalizing, after having lived among them for about 3 years

(Story continues on Page 8)



As evidence that there is life after work, former INEEL employee Bert Barnes, his wife, Sheron, and their family cat, Bandit, set sail across the Pacific Ocean aboard their sailing ship the Tenacious. They mailed these photos from their adventures at sea and among the islands they visited.

You can follow their daily progress on the Internet at www.winlink.org/wl2k. Look for menu item 'APRS,' type in ham call sign (kb9uvj). Find daily position reports on www.bitwrangler.com. You may have to type in the boat name (TENACIOUS), the above ham call sign, and select a menu item called 'YOTREPS' to access a map and their daily position data. Both systems are updated daily by radio e-mail system.

Life after work

continued from Page 6

now, long-range cruisers appear to be independent-minded people whose thoughts and actions are seldom overly constrained by little things like popular opinion, political correctness, and rigid organizational structure. "No" you say, "they are bonkers, out of the envelope, irresponsible, rebellious people who never grew up!" Yes, that too! We have enjoyed getting to know some many of these cruisers. They come from all walks of life. There are firemen, many doctors and engineers, dentists, school teachers, police officers, air traffic controllers, commercial jet pilots and business people. A few common threads in cruisers are they tend to have been financially successful and / or been exceptionally good at making the most of the money they had. Unlike the '60s era hippie types that sailed off into the South Pacific in home-built plywood catamarans, today's cruisers tend to be retired couples between 50 and 80 years old with well-equipped boats. There are some younger cruisers, perhaps on the order of 15% of the population, who have for some reason decided to "eat their dessert first" and sail off into the sunset with smaller boats and less money. They will probably have to pay their working dues to society in later years after returning from paradise. Above all else, these cruisers do have a strong sense of being part of a cruising community. If you are in trouble and need a critical boat part not available locally, a simple radio call is likely to result in a cruiser supplying the missing part and help installing it without hesitation or worry about the cost of the part. "What goes around comes around" is often heard!

Sunday: The winds have died as our weatherman, Don Anderson, had predicted. This makes progress slow at 3 and 4 knots! I found another squid on the deck this morning. I had no idea they fly up out of the water like the flying fish! We keep seeing flying fish off and on most days. We suspect the boat's presence makes them think they are being approached by a predator. If we look out near the front of the boat, we often see the flying fish leap out of the water, circle, glide and reenter the water almost without a splash! I was surprised at how long the flying fish can fly around before reentering the water. They are not just on a ballistic trajectory; they actually fly and change direction at will. We've seen flight times on the order of 10 seconds. Sheron even saw an entire school of them flying around like small birds; that is what she first thought they were! Closer inspection showed they were flying fish about 5 inches long. Are they a "flock" or a "school?"

Some of the boats in the last part of the first wave of puddlejumpers are around us now and some of the second wave could be catching up with us! There just may be some cheaters in the bunch who are using their engines to charge batteries and catch up! So far, we have not run our main engine since raising anchor in Banderas Bay, but we have run the gen. set up twice per day to refrigerate, make water and charge batteries.

Tuesday: We are 1943 nautical miles out of Banderas Bay, Mexico, this rainy morning. We had a tedious night as the rain squalls came and went all night and as they continue to do so here at 9:21 a.m. Pacific Coast time. Just as one of us would get to sleep with two sails out, a squall would require wakening the off duty partner to bring in the genoa fore sail. Sheron is getting some well-deserved rest at the moment while we sail slowly under a reefed main sail with the gen. set doing its job to replenish the batteries and refrigerate.

This morning's radio net showed that we have three boats within 80 nm of us and two more within 160 nm of us. Also there is another group of five boats north of us about 175 nm.

Wednesday: at 0 degrees 55.539'N; 128 degrees 16.751'W, 20:37 hours GMT We are 2054 nautical miles out and nearing the equator, where the sun is out, the breezes are warm, and clothing is optional! Last night was beautiful. We sailed along all night under starry skies and light breezes in smooth seas. Life just does not get any better than that; most ideal! Two other boats from our fleet radioed in on this morning's radio net that they were practicing for an equator crossing party a few minutes of latitude short of the equator. They passed us two days ago and were using their motors to make time in light airs and charge batteries.

Wednesday afternoon: We are 2088 nm out. Here we sit near the equator all becalmed and befuddled, thinking this boat would go faster if it was scuttled! "Life on the edge" sounds exciting, but life on the edge of the equator is slow and easy! Last night was another beautiful night with star-filled skies, a beautiful sunset and sunrise, flat seas and no wind. I even got desperate enough to shake the reef out of the main sail yesterday to maximize the sail area over night. By my most precise calculations and using the most advanced analytical methods known to man, I figure we are 103.6789 feet closer to our destination than we would have otherwise been had I left the sails alone!

Thursday morning: It is the same old routine this a.m., some nice hot coffee, some great leftovers for breakfast, participating on the radio net, charging batteries and refrigerating. We have been sitting here a few miles north of the equator in the doldrums since yesterday afternoon. We kind of like it out here. We are thinking of buying a lot and building a house! The taxes are low, and it is not crowded, but the commute is really bad and we suspect flood insurance might be too expensive for our budget!

Several days later (Arrival @ Hiva Oa) Last night was a tough one as we sailed along the last miles between 1.6 and 2.6 knots so as not to arrive in the dark. Sunup was at 5:49 a.m. local time and we followed the white supply ship and tourist vessel, "Aranui" into a small harbor already overcrowded with sailboats. We only slept about a half hour each last night and it was our plan to anchor and go to sleep immediately, then go to town and start the bureaucratic merry-go-round for check-in and clearances. The place is so beautiful that we gave up the part about sleeping and just went to town. A beautiful river flows into this harbor from very steep jungle covered mountains that rise way up into the clouds. The mountains are over 3,000 ft in places, and they are green and very steep. These high mountains catch rain and create a good water supply that other South Pacific Islanders would envy. One of the first things we noticed is how clean it was here; it is in sharp contrast to Mexico. To have enough pride in your country to want to keep it clean and attractive says something positive about the character of the people who live here.

First Adventures in Hiva Oa: We had a good night's sleep last night in spite of the heat. I am sure we are not actually caught up on our sleep after nearly 24 days at sea and each sleeping about 4.5 hours / night total plus an occasional afternoon nap of 0.5 hours to 1.5 hours. We had several friends come in today who were behind us. The common denominator: they were all tired and weary and happy to be in a safe harbor.

Sunday: Hiva Oa Commentary: The sun came up early here and we got up with the idea of going to church as the Polynesians are famous for their singing. Bottom line, we got there too late; it is between 2 and 3 miles to town. We walked about 2 / 3 the way and then got a ride; in spite of the ride we were still too late by about an hour when we got there about 9:00 am. The three grocery / general stores (called magasins) were all open following church for a few hours. We bought potatoes, wonderful bagets (~2.5" diameter x 2.5' long fresh bread for 40 Franks / loaf or about $0.31 USD) they leave laying around in large open baskets, two 1 pound cans of New Zealand butter, dried bananas, cheese, and some green olives. While walking around town we picked and ate mangos off the trees, picked limes, bread fruit, and other fruits we have no names for. The free fresh fruit, the fresh bread, and the cheese were all wonderful; we sat under some trees in town and made an early lunch of some of our purchases and free fruit.

Even after arriving here several days ago, when we get on shore we still stumble while walking as if we were still on board a rolling rocking boat. Even as a young boy with a great girl friend named Sheron on San Francisco Bay, I can recall the strange feeling Sheron & I had after being on a small boat all day; it generally lasted only about 10 minutes after reaching shore before all was normal with our equilibriums. Not so now, the feeling lasts and lasts. I guess that is what our bodies become accustomed to after nearly 24 days at sea plus all the time spent on board Tenacious at anchor rocking and rolling. Our bodies adapt to widely varying environments given a little time. Our trip to town only required walking about 80% of the entire distance today as we got a ride in the back of another pickup truck along with some small children and a kitten or two. The French and the natives all are so nice to us; this is a great place to visit!

● It is a most beautiful day, the auto pilot is working swell, and we are about 42.5 nm out of Ua Pou (pronounced WA POW) under full sails and making 7.1 knots at a heel angle of 8 degrees. We have two fishing rods out dragging rubbery jigs over the water's surface about 75 feet behind the boat. Those tall islands are most often cloud covered near the top, so in spite of the great height, they are not as easy to see as one might guess.

Clothing is optional here; we do not wear much when around our own boat as it is hot and doing laundry is a pain and a waste of good water! I hope we have time to take Tenacious back to Hooumi Baie to snorkel around the shallow rocks off the beach where we found good sea shells.

● Ua Huka to Nuka Hiva to Nukee Nukee: There is no Nukee Nukee I bet I fooled ya! We sailed out of Ua Huka about 9:30 a.m. We finally did catch some kind of a tuna as we left Ua Huka island. It was only about 2.5 feet long, but more than enough for us. We had some for dinner tonight and it was great! Not at all like canned tuna, as different as night and day! We ate lunch at a restaurant; two 8" long ready-made refrigerated sandwiches of French bread and two Craigmont colas were 600 Polynesian Franks (about $4.72). We bought two loafs of French bread there. Thomas and Maria ran the place and were happy to show us two books of letters written by cruisers over the past 10 years; many had photographs of the sailboats owned by those who wrote the letters. The restaurant was typical of most in that it was an extension of the house the family lives in.

After we walked all up and down the single street in town, we stood under a big tree while it rained like hell. While looking up into the tree to see what delightful fruit might be within arm's reach, a woman with a small child stopped in a foreign jeep of some sort and told us in French to get in the back! She took us right to our dinghy on the beach; we thanked her and gave her small soap and shampoo containers, and after exchanging thank you's, she left. We combed the beach for sea shells, found one good one, and headed out in our dink to Hooumi Bay 4 miles away. The beach was in places covered with little pieces of coral about the size of fried chicken parts; in many places the coral pieces were a foot deep. We found some beautiful sea shells, relaunched the dink and headed back to Tenacious. Bandit had been shut in Tenacious while we were gone and was happy to see us return.

Us lazy old retired folks are living well and happy as two flies in a Mexican fish market.

(Note: Bandit the cat died before the journey ended and was buried at sea.)

Psychology of decisionmaking

Take realistic outlook when facing major choices

On a daily basis, we are confronted with a myriad of decisions.

Some carry very few long-term consequences, while others have the potential to impact our lives in significant ways. These latter, more major decisions, usually involve an element of change that can make it more difficult to deal with the decisionmaking process.

A few of the factors of change that complicate our ability to make decisions include:

● Loss of predictability. We are creatures of habit, and usually like things to stay relatively constant. Being faced with vital decisions takes us out of our comfort zone and threatens our sense of stability.

● Fear of the unknown. Change brings new aspects into play with which we are unfamiliar. Not knowing in advance the long-term effects of our decisions can be disconcerting.

● Loss of control. When we are dealing with decisions not of our choosing, we may get the feeling that our efforts don't make a difference.

In addition, we may fall into some of the following personal traps:

● Taking things personally. We may ask ourselves, "What did I do to deserve this?" or have thoughts that others are out to get us. Most of the time, these situations are due to a larger picture and aren't directed at us personally.

● Hanging onto the past. This involves attempts to re-establish the status quo, including waiting for "the good old days" to return. We may even hold onto being good at what doesn't count. To use games as an analogy, you may be a great checker player, but if the rest of the world is playing the latest video games, you won't be effective.

● Playing the "victim" role. This involves blaming others for the change and implies feeling helpless. While we may not be able to control a given situation, we always have choices in how we respond to things. As Jim Scott mentioned in his last article, "If the river is rising, it's a waste of energy to scream at the river — fill sandbags or move to higher ground."

Ken Minnix

In addition to working through the above-mentioned concerns, making major decisions includes the following aspects:

● Ask yourself, "What is the worst realistic thing that could happen?" Avoid seeing the circumstances as catastrophic, or entertaining unrealistic outcomes to the situation. Focus on the real possibilities.

● Gather the pertinent facts. The more you know about a given situation, the easier it is to make a decision. Be careful not to get stuck in simply getting more information for information's sake; stick to the important facts.

● Get input from your support system. Increase the objectivity of your decision by checking things out with someone not directly affected by the outcome of the decision. They may see things that you aren't aware of or look at things in a different light.

● Make two lists — advantages and disadvantages — of each possible option. It is important to consider both the long- and short-term consequences of your choices.

● Consider your feelings. It is interesting to note that even after gathering the facts and considering pros and cons, we usually make our decisions more on how we feel than on what we know.

● Decide on a course of action. Choose the alternative that brings the greatest balance of consequences and that you feel best about.

● Develop a plan. Figure out what resources are available to help you implement your plan, and mitigate the roadblocks to your plan.

Both research and experience have shown that those who tend to handle critical decisionmaking the best are likely to possess several of the following attributes: They

● perceive change as an opportunity rather than a threat

● have developed a basic philosophy of life that puts decisions into perspective

● are connected to a support system

● are conscious of their need for proper diet, exercise and sleep, and

● maintain a healthy sense of humor.

When confronted with major decisions, the worst approach is to do nothing and have the decision made for us by others or by default. Taking control of our decisions puts us in a position of influence over our lives. As the seasoned baseball umpire responded when asked his philosophy of calling balls and strikes, "It's not a matter of calling them as I see them. What I call them makes them what they are."

If you would like a confidential setting in which to discuss the decisions facing you, feel free to call the OMP Employee Assistance Program at 526-0218.

INEEL develops safe, efficient process to make cleaner-burning fuels

With millions of cars and trucks on the road nationwide each day, it's easy to see why motor vehicle air pollution is a formidable problem.

INEEL researchers have developed a safe, environmentally friendly process to make cleaner-burning fuel. They developed an energy-efficient process for producing alkylate: a high-octane gasoline blend that is very low in environmental pollutants.

The team uses a solid acid catalyst to change low-octane gaseous feedstock into liquid alkylate. Once the solid catalyst becomes coated with undesired hydrocarbons, researchers use a supercritical fluid solvent to clean and rejuvenate the catalyst, and then begin alkylate production again.

Researchers have been able to completely restore deactivated catalyst to 100 percent effectiveness, which increases the active lifespan of the catalyst about 20 times. INEEL researcher Dan Ginosar presented this research at the 222nd American Chemical Society national meeting Aug. 26-30 in Chicago.

"This ultra-clean fuel makes up a mere 13 percent of the fuel market. Currently existing plants just can't supply enough of this fuel," said Ginosar. The goal of this research is to make ultra-clean fuel production safer for workers and the environment, so alkylate fuel production becomes more feasible.

Industry partner

INEEL's industry partner, Marathon Ashland Petroleum, supplied the solid acid catalyst used in this research. It looks like bits of uncooked vermicelli. The solid, zeolite catalyst poses no threat to refinery workers or the environment and should appeal to industry more than a liquid catalyst because it's safer and easier to handle, transport and store.

The solid zeolite catalyst is porous, providing a lot of surface area to catalyze the reactions that change butane/butene petroleum gases into liquid alkylate. The catalyst surface, however, eventually becomes coated with undesirable hydrocarbons that effectively deactivate the catalyst, and is a challenge to "clean." Researchers are using supercritical fluid solvent to efficiently clean the catalyst.

Ginosar has achieved a week-long run of the alkylation/regeneration cycle maintaining at least 90 percent recovery of catalyst activity. He is now investigating how many times the catalyst can be regenerated, a primary factor in how cost-effective this new alkylation process could be in the future. The longer the catalyst lasts, the more economical the process will be.

Recent experiments

The team has recently begun experiments using a commercial alkylation feed stream obtained from Phillips Petroleum Company, work that should be of critical interest to the broader petroleum industry. The team has already achieved comparable alkylation production and catalyst regeneration results using the industry-grade feedstock.

DOE Office of Fossil Energy funded this research in response to the recommendations of a panel of petroleum industry reviewers. The industry review team ranked the research as the top proposal, a clear sign of industry interest and research priorities.

Scaling this process up to meet industrial production rates is the next challenge. In their nearly nine-day experimental run, the team produced 0.2 liters of alkylate, a far cry from the 2 million liters per day a refinery would produce. The catalyst regeneration vessels used in this research are about the length of a size 13 shoe, and the diameter of a garden hose.

"We'll have to scale up our equipment more than 60 million times their current size," said Ginosar.

Long-term approach
Investment Committee's philosophy: Follow steady course

While the stock market rises and falls for many reasons, INEEL's Retirement and Investment Committee is steering a steady course for the long term.

INEEL employees invested in more aggressive funds have seen their portfolios drop in the past two calendar years, yet the overall performance of INEEL investment plan funds has kept pace with or outperformed the typical diversified portfolio.

As a general rule, funds under the direction of the Committee have less volatility (upward and downward movement) than the stock market as a whole.

Paul Rosenkoetter, Management Systems Restructuring vice president, says that's because the Committee's philosophy — for both the pension plan and the 401(k) retirement plan — is to offer to employees funds geared to long-term investors. These tend to be less volatile than most managed mutual funds.

Pension plan, 401(k) plan

The INEEL Retirement and Investment Committee, made up of INEEL executives, a Bechtel National executive, a BWXT Technologies executive and a labor union representative, oversees both the 401(k) plan and the INEEL pension plan.

The committee makes decisions on the pension and the 401(k) plans using advice from financial experts with Merrill Lynch, Vanguard and the nine companies that manage pension plan funds. One of those fund managers is PIMCO (bond fund). PIMCO's chief investment officer was named bond fund manager of the year the past two years by Morningstar, an independent mutual fund rating company.

Internal Revenue Service rules guide both the pension and 401(k) plans in a manner that safeguards employees' interests.

Three INEEL employees — Jason Killpack, Candace Wilkinson and Fred Yost — review consultants' advice and offer recommendations to the committee.

Rosenkoetter says employees should review the Vanguard mailing entitled, "Taking a closer look at your investment mix." Based on individuals' responses to 10 investing questions about their investing risk tolerance, it offers suggestions on a mix of funds employees can choose from the INEEL employee investment plan offered through Vanguard.

"We don't advocate anything to individuals or give advice, but overall, it's important that people realize the 401(k) plan is a long-term investment, and they shouldn't do market timing."

In short, he advises employees to invest a portion of their income from each paycheck and not worry about the upward and downward movements of the stock market.

While INEEL retirees traditionally depended on the pension plan for a large part of retirement income, younger workers will tend to rely more on their 401(k) investments, Rosenkoetter says.

New funds

In July, employees participating in the 401(k) plan had the opportunity to invest in three new funds that give them exposure to mid and small capitalization markets. While these funds are slightly more aggressive than existing funds, they offer long-term investors exposure to parts of the market not available in the 401(k) plan to date.

The three new funds are the Vanguard Capital Opportunity Fund (aggressive mid cap growth) that combines stocks and bonds; the Pilgrim Small Cap Opportunities Fund (aggressive small cap growth); and the Van Kampen Aggressive Growth Fund (aggressive mid cap growth).

"The Investment Committee's philosophy is that we need to add new funds periodically to keep up with the industry, and to give employees options to keep their portfolios diversified," Rosenkoetter says.

Most large companies offer nine to 12 investment options, so with a dozen options, the INEEL Investment Plan matches the typical large company's investment offerings.

Rosenkoetter suggests those who would like general advice on investment options are welcome to call the Benefits Accounting Office. While INEEL employees cannot give specific investing advice to co-workers, they can explain choices available to those who are uncertain about the best mix of investments for their portfolio.

"No one in the company wants to go out on a limb and offer advice," he says. "We will show their options and the return on investment over time, and they can weigh the risk level, and growth versus value ideas."

He advises employees to diversify their retirement investments in an array of stocks and bonds, similar to the INEEL Investment Plan committee's philosophy of offering diversified investment choices for long-term investors.

Ethics/Employee Concerns Program issues reminder

Dennis Patterson, INEEL's Ethics/Employee Concerns manager, asks all employees to review their rights and responsibilities in the area of ethics and employee concerns.

Those responsibilities include being familiar with company policies and adhering to them, and to report improper or unethical behavior.

The INEEL Standards of Conduct and Business Ethics has been made available to all employees and is available on the INEEL Ethics/Employee Concerns home page.

Patterson went on to say, "management has the responsibility to create an open atmosphere in which concerns may be brought by employees and resolved without fear of retribution."

He pointed out the DOE Employee Concerns Program was established by DOE Order 442.1 to ensure employee concerns about issues dealing with environmental safety and health, and management of DOE programs and facilities, are addressed.

The Ethics/Employee Concerns Program has an expanded scope that includes environmental safety and health, allegations of suspected violation of laws, regulations, company policy or standards of business conduct, and issues of fair treatment. The goal of the office is to help ensure all employees, including management, do the right thing.

Patterson encourages employees to report concerns first through their management chain. If that resolution channel fails -- or if employees are not comfortable -- they can report concerns to the appropriate office for assistance and resolution (offices include the Ethics/Employee Concerns Office, Employee Issues & Diversity Initiatives, and Legal).

Represented (union) employees may also contact Labor Relations. The Ethics Office cannot work on issues addressed in union contracts.

The Ethics manager wants all employees to know that any acts of retaliation for reporting concerns may also be reported. An employee who believes he or she is being retaliated against for any reason can report such concerns to the Ethics Office. The company has a zero tolerance for retaliation. If proven, appropriate action will be taken, up to and including termination.

For more information, employees may contact the office by several means. Those who wish to remain anonymous may call the Help Line at 526-0333, or contact Patterson (526-1477, bzp@inel.gov) or Joan Mehner, administrator (526-1149, jdm@inel.gov). Employees may also contact Paul Allen, DOE Employee Concerns manager (526-0128, allenph@exchange) or the DOE Help Line (526-7200).

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John Howze.....526-6864
Reuel Smith.....526-3733
Steve Zollinger.....526-9590
John Walsh.....526-8646
Kristen Akins-Burns.....526-7225
Kathy Gatens.....526-1058

Correspondents

ANL-W, Paul Pugmire.....533-7331
NRF, John Morris.....533-5484

Two INEEL administrative assistants proudly took their places as the latest recipients of the Lou Milam Next Step Scholarship awards at a ceremony Aug. 6.

Penny Howe, a principal office specialist in the Applied Geosciences Department, and Leilani Toelcke, an office specialist in text processing, joined a number of past recipients in accepting the award named after the late Lou Milam, a longtime INEEL administrative assistant.

Penny Howe

Stu Milam, a former Department of Energy-Idaho Operations Office executive who founded the scholarship in memory of his late wife, presented the awards designed to encourage administrative assistants to pursue their dreams through higher education.

Leilani Toelcke

The scholarships recognize full-time, nonexempt INEEL employees who have earned at least 15 semester hours of university credits, maintain a positive attitude and have been successful at work and in their education pursuits.

"Anyone who knew Lou, knows she possessed these attributes," Polly Mortell, keynote speaker, said at the ceremony in the Engineering Research Office Building. She described Milam as "a dear, sweet friend who was kind, caring and interested in everyone. I can feel her presence, and this award really perpetuates her memory. This award carries on the legacy of Lou Milam's ideals. She was an inspiration to those with whom she worked."

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ACCOLADES

Jacopo Buongiorno, Ph.D., INEEL nuclear engineer in the Advanced Nuclear Energy Directorate, has been awarded the 2001 American Nuclear Society Mark Mills Award. He will receive a cash award and plaque at the ANS luncheon Nov. 13 in Reno, Nev.

Jacopo Buongiorno

The award recognizes the best original technical paper contributing to the advancement of science and engineering related to the atomic nucleus. Buongiorno's paper, "Thermal Design of a Lead-Bismuth Cooled Fast Reactor With In-Vessel Direct-Contact Steam Generation," was presented in April 2001 at the Ninth International Conference of Nuclear Engineering in Nice, France.

Buongiorno came to the U.S. Department of Energy's INEEL in 2000. He is working on design research and development of advanced reactors. He has also organized and chaired several technical sessions at national and international conferences and workshops and supports the Generation IV Technical Working Group on water-cooled reactors. Buongiorno has authored or co-authored several journal articles.

An ANS member since 1999, Buongiorno has a master's degree in nuclear engineering from the Polytechnic of Milan and a doctorate from the Massachusetts Institute of Technology, where he also served as a teaching assistant and received the Best Teaching Assistant award in 1998 and 1999.

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Ben Rinehart, recently retired engineer from the Department of Energy's Idaho National Engineering and Environmental Laboratory, received the prestigious 2001 American Society of Civil Engineers Rickey Medal at the WaterPower XII Conference in Salt Lake City in July. The medal is awarded for major contributions to the science and progress of hydroelectric engineering.

Of his 45-year engineering career, he spent the last 20 years at the INEEL helping define and direct the hydropower research program for the Laboratory, and identifying and rigorously analyzing key issues.

Ben Rinehart

Rinehart's work at the INEEL included managing the DOE Small Scale Hydropower Demonstration Project and DOE Hydropower Technology Transfer Program and serving as consulting engineer on such projects as the DOE Alaska Hydropower Projects, "Fish Friendly" Advanced Hydroturbine Research and Development, the U.S. Army Corps of Engineers Fish Facility Design Review Working Group and the Corps' Turbine Fish Passage Working Group.

He has had papers published in WaterPower, Hydro Review Magazine and the independent Energy Magazine. In addition, Rinehart has been active on numerous national and international research committees and conferences related to hydropower issues and conservation. Also, he is a mentor to Shoshone-Bannock High School students in the Shoshone-Bannock Tribe's ongoing Native American Science Research and Education Program.

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Idaho Accelerator Center receives grant from state Board of Education

A grant from the Idaho Board of Education will allow the Idaho Accelerator Center (IAC) to develop advanced radiation science applications ranging from detecting smuggled nuclear material to improving cancer treatment and medical imaging.

With a three-year, $1 million grant from the Higher Education Research Council, Idaho State University's Idaho Accelerator Center will also support the industrial community with material failure analysis, and the agricultural community with testing a nonchemical pesticide.

"The Accelerator Center has two primary roles — as a multi-disciplinary research center and as an education institution," director Frank Harmon said. "This grant allows us to expand both roles and firmly establish the Center as a premier facility for accelerator applications and radiation science."

Grant beneficial

The grant will support the development of these applications through the hiring of additional full-time research faculty and postdoctoral fellows, establishing student research assistantships, and completing capital investments for laboratory expansions.

The IAC, located in Pocatello, has operated since 1994 in partnership with the Idaho National Engineering and Environmental Laboratory and the U.S. Department of Energy. The projects developed with this funding expand commercial applications of accelerator research while continuing to support DOE environmental and national security needs.

Improvements

The grant will allow improvements to accelerator-based analytical capabilities at the IAC, including photon activation and proton-microbeam analyses. Photon activation uses energetic photons to induce gamma-ray spectra to identify unknown elements in a sample. Like other accelerator applications, this process offers a much less expensive and more benign activating source than nuclear reactor-based systems. Photon activation analysis provides mining companies a low-cost method to identify the composition and richness of an ore. The method can also analyze industrial emissions to determine content and potential impacts to the environment.

The proton microbeam makes it possible to analyze samples at the micron level. The microbeam scans repeatedly across an object, creating a 'map' of the surface's elemental composition. This technology has immediate applications in biology, geology, engineering, chemistry, and physics in addition to art and anthropology where artifacts can be analyzed without damaging or otherwise touching them.

The grant will also support the development of a novel electron / laser interaction photon source. The controlled interaction of a laser beam with a very short, intense electron beam produces scattered photons with a pre-defined energy and well defined scattering direction. Currently, large and costly synchrotrons produce these specialized photons, used for semi-conductor manufacturing, and unique image characterization of molecules and crystalline material. The IAC may offer an economically competitive source.

Sterilization processes

IAC researchers will also conduct studies of radiation-sensitivity of bacteria and viruses in accelerator-based sterilization processes such as for dental equipment and waste streams, and for non-chemical control of agricultural pests using ionizing radiation that leaves no residual toxins and has no long-term environmental effects.

"The Idaho Accelerator Center is clearly poised to become a major, world-class research center," said James Jones, INEEL nuclear scientist and associate director of the center. "We have outstanding facilities and equipment of unusual diversity and scope. The IAC is already enhancing Idaho's national and regional reputation for radiation science research."

INEEL receives VPPPA national safety recognition, DOE 'Superior Star' award

Two Idaho National Engineering and Environmental Laboratory safety programs earned national recognition recently.

The INEEL's annual Safety Expo earned the Voluntary Protection Program Participants Association's prestigious Safety and Health Outreach Award at the organization's national meeting Aug. 27.

At the same meeting, the Department of Energy presented the INEEL with the 'Superior Star' award for its Voluntary Protection Program.

The VPP Site Safety and Health Outreach Award recognizes "VPP models" that reach out to share their safety and health technical and management expertise. The award is for an individual and/or company that has achieved an outstanding level of outreach in the safety and health arena.

The INEEL VPP has sponsored a Safety Expo for the community of Idaho Falls and surrounding areas for the past four years. Since its inception, the Safety Expo has grown from a one-day event with only 200 attendees to a two-day event with over 15,000 attendees, approximately 9,000 of which have been local school children. Eastern Idaho Regional Medical Center was named co-sponsor of this year's event.

The DOE 'Superior Star' award recognizes the INEEL as a leader in safety and health performance. The INEEL has achieved a consistently superior level of performance in meeting established safety and health goals, actively conducting outreach to others and achieving an injury and illness rate of at least 50 percent below the Bureau of Labor Statistics national average for the Standard Industrial Classification/ North American Industrial Classification System code.

The INEEL was recognized as the first DOE national laboratory to achieve VPP Gold Star status on July 12, 2001. Gold Star status, the highest award that can be achieved by any workplace, recognized the culmination of several years of review and evaluation of the INEEL's safety environment.

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Flags are at half-staff at the INEEL and across the nation following a day of terrorist attacks in New York City and Washington, D.C.